Norwegian Hydrogen Forum

European Commission

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Norwegian Hydrogen Forum's recommendations for the new EU hydrogen strategy

Norwegian Hydrogen Forum (NHF) welcomes the opportunity to contribute to the Commission's call for evidence on a new EU hydrogen strategy.

Key recommendations

- Strengthen long-term predictability by building on existing regulation and binding obligations, with adjustments where progress has been slower than expected.
- Create demand through minimum requirements for clean hydrogen uptake and low-carbon products, and through public procurement.
- Allow more flexibility for industry by giving low-carbon hydrogen a larger role and clearly defined deployment pathways.
- Recognise hydrogen as a contributor to energy system resilience, security of supply and defence preparedness.
- Reduce risk for first movers through predictable, long-term funding schemes.
- Establish a new Clean Hydrogen Joint Undertaking in the next MFF to bridge the gap between demonstration and industrial scale-up.

Strengthen long-term predictability by building on the regulation and obligations already established

Looking towards 2040, it is important to acknowledge the progress achieved since the publication of the 2020 hydrogen strategy. By the end of 2026, approximately 1 gigawatt (GW) of hydrogen production capacity by electrolysis will be operational throughout Europe, an increase from 80 megawatts (MW) in 2020. Already-made investment commitments suggest that more than 3 GW of additional capacity will be commissioned soon. While this is far below the 40 GW target set in the current strategy, this represents considerable progress. In less than

Norwegian Hydrogen Forum
Address
Møllergata 6-8
0179 Oslo, Norway
Org.nr. NO 980 573 281 MVA
post@hydrogen.no
www.hydrogen.no

a decade, hydrogen has evolved from small scale piloting and demonstration to a diversity of applications, with large-scale production and offtake in some sectors such as refining. This development is important not only for the decarbonisation of Europe's economy in line with commitments under the Paris Agreement, but also for the competitiveness of European industry, as highlighted in the Draghi report, and for Europe's energy independence, as became evident when the Strait of Hormuz was closed earlier this year.

The Norwegian value chain for hydrogen and hydrogen-based fuels is evolving at an equally accelerating pace. With the investment decisions taken so far, production of clean hydrogen will increase five-fold in the coming years, and hydrogen will become available for consumption in large parts of the country. On the demand side, there is noticeable development in all hard-to-abate sectors, particularly in the maritime sector. More than 20 new vessels under construction will increase demand for hydrogen-based fuels significantly when they enter operation from the end of 2026 and onwards.

Although existing EU and national policy increasingly lead to investments in production, infrastructure and use of hydrogen, uncertainty about the policy framework towards 2040 remains the most important barrier for many projects. To build on the momentum achieved so far, predictability is needed above all. The new strategy should therefore strengthen long-term predictability by building on the frameworks and binding obligations already established. Rather than completely redesigning the target structure and regulatory landscape, we call for adjustments in those sectors where progress has been slower than expected, and for more flexibility in those policy instruments that have yet to enable and accelerate the uptake of hydrogen.

Hydrogen remains an indispensable solution for decarbonisation in sectors and user segments where electrification is impossible or very difficult and costly. In Norway, the Norwegian Environment Agency highlights domestic shipping, aviation, industry, construction sites and various heavy-duty vehicles and machinery for both on-road and off-road purposes. Alongside decarbonisation, the renewed hydrogen strategy should recognise the strategic importance of hydrogen for Europe's energy independence, industrial competitiveness and resilience in the face of increased geopolitical competition.

Strengthening resilience, security of supply and energy independence

The closure of the Strait of Hormuz and continued military conflict in the Middle East show clearly how dependent Europe is on imported fossil fuels. The EU's electrification agenda is one important response to this challenge. However, hydrogen can and must also play a central role in developing an energy system that not only provides clean and affordable energy for all Europeans, but also reduces exposure to disruptions in global supply chains and strengthens

the continent's industrial capacity. The new strategy should propose measures to strengthen the following capabilities:

Energy system resilience:
As renewable electricity production and electrolyser capacity continue to expand, hydrogen can be produced utilising surplus electricity from renewable sources. In Norway, such production is already in operation and under construction at sites where the electricity grid cannot absorb all the hydropower produced. There is potential for such combined electricity and hydrogen production at several other sites across the country, and the expected offshore wind build-out on the Norwegian Continental Shelf (NCS) in the 2030s may provide additional opportunities. Ongoing Norwegian research projects and production plants entering operation before 2030 will provide important insights into how electrolysers can be operated more flexibly than today, by adjusting production to fluctuations in renewable electricity generation and electricity demand. Hydrogen can also provide large-scale, long-duration energy storage, potentially reducing the need for costly grid expansion.

Diversifying energy supplies:
Norway is a net importer of diesel, marine gas oil (MGO) and jet fuel. Build-out of domestic hydrogen production and consumption will therefore reduce the need for fossil fuel imports and exposure to disruptions in global supply chains. For example, vessels operating along the Norwegian coast are increasingly being built or retrofitted with dual-fuel propulsion systems. If the supply of diesel is disrupted, the vessels can switch to hydrogen, and vice versa. Moreover, clean hydrogen produced in Norway already supports energy diversification in EU member states. Further projects with export ambitions can reach investment decision and be commissioned if the European market continues to develop steadily.

Defence and dual-use capabilities:
The new strategy should propose measures that create synergies between energy sector development and defence initiatives. For example, hydrogen-based synthetic drop-in fuel production may be established to serve civilian needs in peacetime and defence needs in times of crisis and war. In the event of war in the Nordic region, Norway will be a nost nation with responsibility for supporting allied forces. In such a scenario, the fuel demands of both Norway and allied forces must be met. Production must therefore be scalable to meet NATO's needs, and the capabilities needed in crisis and war must be built in peacetime. Domestic production of synthetic drop-in fuels can not only diversify fuel supply and support military preparedness, but also contribute to technological innovation, cost reductions and greater resilience in industrial value chains.

Other hydrogen applications in defence are increasingly becoming relevant. Norway's new submarines will depend on a functioning hydrogen value chain when they enter service from 2029. Hydrogen's high energy efficiency relative to diesel, as well as its low noise and thermal

signature, can also provide operational advantages, for example in unmanned systems operating in remote and/or cold environments.

Safeguarding industrial competitiveness and supply chains:
Although China leads in electrolyser manufacturing capacity and the roll-out of hydrogen infrastructure, the EU still has the technology, skills and capacity for innovation required to develop a European manufacturing industry for hydrogen technologies such as electrolysers and other equipment that is competitive in the global market. Such an industry can support reliable and decarbonised production of steel, chemicals, fertilisers and other essential products in Europe. To secure competitiveness, industrial policy, public procurement practices and funding schemes must contribute to making technology made-in-Europe the preferred choice.

Where union-origin requirements are introduced, they should apply only to strategic components inside the electrolyser stacks, and not the entire balance of plant (BOP). BOP components are typically more commoditised, less strategic and often outside the direct scope of electrolyser OEM manufacturing, while representing a significant share of overall CAPEX. Capturing BOP would increase costs for European manufacturers without strengthening Europe's strategic electrolyser value chain, making European electrolysers less competitive versus non-EU electrolysers. Union-origin requirements should also cover the entire European Economic Area (EEA) to avert fragmentation of the internal market.

Create demand by establishing minimum requirements for clean hydrogen

The 2020 strategy emphasises hydrogen availability and infrastructure development as enablers for hydrogen consumption. In the next phase of market development towards 2040, emphasis on demand creation must be strengthened. Obligations to use clean hydrogen or low-carbon products should be at the centre of this strategy. To ensure that such obligations are implemented and enforced successfully, they must be accompanied by measures dedicated to reducing risks and costs for first movers. Preliminary experience from the national transposition of the Renewable Energy Directive of 2023 (RED III) shows that sector-specific sub-targets for hydrogen can be a powerful tool to stimulate demand, provided that certain conditions are in place:

1. Successful transposition of the transport sub-target requires sufficiently high penalties and a long time frame, as exemplified by Germany and Spain, which have extended their targets towards 2040. This gives fuel suppliers both an economic incentive and long-term predictability needed to diversify and invest in new infrastructure.
2. Relevant financial frameworks and funding mechanisms must be in place to provide risk relief for the industry stakeholders who are first to invest in production, distribution, storage and use.

3. Industry must be coordinated throughout the value chain, have technology, permits and grid access in place, and be ready to invest.

We are currently seeing accelerated market development in the transport segment, where regulatory and financial frameworks are coming in place in key member states, and where industry is ready to invest. Experience from Germany suggests that total cost of hydrogen truck ownership (TCO) can reach parity with diesel. To ensure continued progress, it is vital that the EU maintains long-term predictability by extending the transport sub-target to 2040 and by raising it in a manner consistent with the EU's target of reducing net greenhouse gas (GHG) emissions by 90 % by 2040. This should support the creation of a union-wide market for hydrogen in heavy-duty transport. To ensure that the entire EEA is included, a revised Alternative Fuels Infrastructure Regulation (AFIR) should extend the requirements for maximum distances between HRS to the comprehensive TEN-T network.

Public procurement and emission reduction requirements in key sectors

Norway's hydrogen value chain has partly been developed by utilising the purchasing power of public entities such as the Norwegian Public Roads Administration. MF Hydra became the world's first ferry to operate on liquid hydrogen in 2023, and two new hydrogen ferries will enter operation in 2027. Combined with investment support for hydrogen vessels from state enterprise Enova, strict climate requirements in public asphalt contracts have triggered investments in hydrogen-powered bulk vessels. These will significantly reduce GHG emissions in the Norwegian asphalt value chain. In addition, Norwegian public procurement rules require climate and environmental considerations to be weighted by at least 30 % in tenders.

Minimum requirements for zero-emission technology or GHG emission reductions, such as in Norway's UNESCO World Heritage fjords, for offshore supply vessels, at public construction sites and high-speed passenger vessels in public transport, can contribute to further investments in hydrogen. At European level, requirements for zero-emission technology or low-carbon products could be developed for steel, fertilisers, defence applications, data centres, offshore wind tenders and car manufacturing. In the maritime sector, the upcoming revision of FuelEU Maritime should extend the RFNBO multiplier and introduce binding clean hydrogen requirements.

A more flexible approach to industrial hydrogen consumption is needed

For energy-intensive industries such as steel, chemicals and fertilisers, not all necessary enabling conditions are yet in place. In Norway, several pilot projects are ongoing or planned, for example in aluminium recycling, fertilisers, reinforcing steel, asphalt, titanium slag and high-purity pig iron. Furthermore, existing fossil hydrogen consumption in oil refining and methanol production must be decarbonised. To move from pilot to large scale, minimum requirements for clean hydrogen or low-carbon product requirements must be supplemented by a range of

other measures, such as expansion of renewable electricity production and grid infrastructure, support for continued technology development, and hydrogen-specific funding schemes at EU level through the Industrial Decarbonisation Bank and its Investment Booster. Supplementing programs at national level must also be in place for technology development, indirect cost compensation and/or auctions for large scale point emission reductions.

More flexibility is needed to be able to achieve the EU's RFNBO targets for industry of 42 % by 2030 and 60 % by 2035. Implementing and enforcing the target has been challenging of a variety of reasons. Notably, the current delegated acts for RFNBO have contributed to higher costs, thereby impeding hydrogen uptake. We therefore welcome the Commission's announced targeted review of the delegated act. The review should postpone the application of the additionality principle and hourly temporal correlation and extend the grandfathering period for early projects. To take national differences into account, we also suggest that overachievement on one (transport or industry) target should be allowed to help contribute to fulfilment of the other target.

Furthermore, low-carbon hydrogen will be needed to decarbonise industry. Low-carbon hydrogen will reduce costs, provide larger volumes and accelerate hydrogen uptake in those sectors where hydrogen is both most needed, and where the risk of carbon leakage is most pronounced. Although the current policy framework in principle allows for low-carbon hydrogen, in practice it has prevented investments. The RFNBO target for industry has been too inflexible by limiting pathways to reach the target with the use of low-carbon hydrogen. Financing mechanisms have also been either insufficient or not yet in place. If obligations to use clean hydrogen in industry are extended towards 2040, it is therefore crucial that the rules allow for a larger share of low-carbon hydrogen, and pathways for deployment must be clearly defined. To incentivise hydrogen produced with the lowest-possible CO2-intensity, project-specific verification and certification of upstream emissions from natural gas should be made possible.

Reduce risk for first movers

As EU legislation is transposed nationally and industry gains experience from the projects being commissioned now, existing funding schemes under the Innovation Fund and other programmes will result in new investments. However, there are still significant barriers to overcome, and it is therefore important to further develop the financial framework and funding schemes established in recent years. Whether a funding scheme is based on a principle of first-come-first served, competitive bidding or free allocation of allowances, it is crucial that it provides long-term predictability with regular application deadlines and, preferably, long-term revenue certainty. The Industrial Decarbonisation Bank and its Investment Booster, the Sustainable Maritime Alternative Propulsion (SMAP) mechanism and the support for

sustainable aviation fuels proposed under the ETS should be designed to strengthen the investment case for hydrogen in industry, maritime transport and aviation.

A reinforced hydrogen Joint Undertaking to underpin European technology leadership

The next decade will determine whether Europe can lead in the emerging market for clean hydrogen, and it is crucial that the EU continues to support hydrogen research and innovation (R&I) ambitiously in the next Multiannual Financial Framework (MFF) and towards 2040. A reinforced and dedicated Joint Undertaking for hydrogen can lead to important investments that contribute to reduced GHG emissions, increased security of energy supply, future-oriented industrial development and international competitiveness.

The current positive development of hydrogen in Norway exemplifies how sustained investment in R&I leads to concrete market development and the scale-up of hydrogen production and use. Various EU initiatives such as the Clean Hydrogen Joint Undertaking have made important contributions to the development of the Norwegian hydrogen ecosystem. In total, Norwegian research institutions and industrial partners have participated in approximately 40 projects funded through the Joint Undertaking. In March this year, Norway's first Large-Scale Hydrogen Valley, NORHyWAY, was established. The public funding received by the project consortium makes it possible to use already-made investments as a springboard for additional investments. This contributes to accelerated scale-up of production, distribution and consumption of hydrogen at a relatively low cost. Further hydrogen valleys are being planned in all parts of the country.

Further research is needed throughout the value chain to develop emerging technologies, improve the efficiency of existing technologies and reduce costs. The value chain is complex and requires coordination and public-private collaboration. In particular, the EU's R&I framework has a funding gap between first demonstration at Technology Readiness Level (TRL) 6-7 and industrial scale-up at TRL 8-9. It is crucial that this gap is closed and that clear pathways are given from TRL 6-7 to industrial replication and market uptake. The next framework programme should therefore bridge early-stage R&I and market scale-up by combining Horizon Europe with the European Competitiveness Fund through a dedicated and adequately funded independent programme for hydrogen. A new Clean Hydrogen Joint Undertaking should be established.

About Norwegian Hydrogen Forum (NHF)

Norwegian Hydrogen Forum is the national association for hydrogen and its derivatives in Norway. Its members represent the entire hydrogen value chain, from producers and distributors to end users, and include industry, public authorities and academia. NHF promotes

its members' interests towards public authorities and decision-makers and works actively to disseminate key information on hydrogen as an indispensable climate solution.

With kind regards
Norwegian Hydrogen Forum

Ingebjørg Telnes Wilhelmsen
Secretary General

Tor Kristian Haldorsen
Lead Advisor Government and International Relations